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# Is microtubule disassembly a trigger for cold acclimation?

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## Abstract

Cold acclimation was followed in three cultivars of winter wheat (Triticum aestivum L.) that differ in freezing tolerance, using root growth as the indicator. During acclimation (followed through 7 d at 4°C), growth rate progressively recovered. The recovery was fast in the tolerant, slow in the sensitive cultivars. The development of freezing tolerance was followed by a challenging cold shock administered after various time intervals of acclimation. Acclimation proceeded faster in the tolerant cultivars. Microtubules were monitored during the acclimation period. A rapid, but transient partial disassembly in the tolerant cultivars preceded the formation of cold-stable microtubules and the recovery of growth rate. In contrast, this transient disassembly was absent in the sensitive cultivar. When a transient disassembly was artificially generated by a pulse-treatment with the antimicrotubular herbicide pronamide, this could induce freezing tolerance. The appearance of cold-stable microtubules was accompanied by a reduced abundance of type TUA1/2 a-tubulin isotypes. These findings are discussed with respect to a role of microtubule disassembly in the sensing of low-temperature stress.

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## Keywords

Cold acclimation, Microtubules, Pronamide, Winter wheat (Triticum aestivum L.)